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The Health Belief Model and Factors Relating to Potential Use of a Vaccine for Shigellosis in Kaeng Koi District, Saraburi Province, Thailand

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ABSTRACT

Shigellosis is an important cause of morbidity and mortality throughout the world. Approximately, 1.1 million deaths occur a year due to this disease, making it the fourth leading cause of mortality worldwide. This paper explores local interest in and potential use of a vaccine for shigellosis in Thailand where *Shigella* poses an important public-health concern. Data for this study were collected during June-November 2002 from 522 subjects surveyed using a sociobehavioural questionnaire in Kaeng Koi district in central Thailand. The community demand and likely use of a vaccine were examined in relation to the Health Belief Model, which provides analytical constructs for investigating the multiple issues of local readiness to accept and access a new vaccine. As the key outcome variable, most respondents showed interest in receiving a vaccine against dysentery which they thought would provide useful protection against the disease. However, there was only a moderate number who perceived dysentery as serious and themselves as susceptible to it, although it was perceived to cause some burden to and additional expense for families. Most people identified a number of groups who were thought to be especially vulnerable to dysentery, such as the elderly, pre-school, and school-age children, and poor labourers. Other outcomes of the study included the identification of acceptable and convenient sites for its delivery, such as government health clinics and private clinics, and respected sources for information about the vaccine, such as health clinic personnel and community health volunteers. This information suggests that components of the Health Belief Model may be useful in identifying community acceptance of a vaccine and the means of introducing it. This health information is important for planning and implementing vaccine programmes.

Key words: Dysentery, Bacillary; *Shigella*; Bacterial vaccines; Health Belief Model; Perceptions; Cross-sectional studies; Thailand

INTRODUCTION

Shigella, the enteric pathogen, is still an important cause of morbidity and mortality throughout the world. Approximately, 1.1 million deaths occur each year due to shigellosis, making it the fourth leading cause of mortality worldwide (1,2). Because of growing limitations in its treatment and in community-control measures against it, there has been an increasing international interest in an effective vaccine against the disease (1,3). Reduced

efficacy of treatment of shigellosis is partly due to the progressive growth of drug-resistant strains of

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Shigella. This development has potentially devastating consequences for endemic and epidemic outbreaks of shigellosis. In addition, government resources needed to combat its spread through improved sanitation and water supplies are often inadequate in areas where it is most prevalent (4,5).

Attempts to produce a vaccine that is effective against the various species of *Shigella*, such as *Shigella dysenteriae*, *S. flexneri*, and *S. sonnei*, have not yet been successful. However, there is increasing promise for the production of a safe and effective vaccine in the near future (3). Therefore, a policy and planning context for instituting vaccination against shigellosis needs to be considered in countries with a history of endemic and epidemic shigellosis. Critical in such considerations are the level of community demand and the associated barriers and facilitators that may affect the acceptance and accessibility of a vaccine (6,7).

Based on a history of both epidemic and endemic conditions of the disease, this paper explores local interest in and potential use of a vaccine for the disease in Thailand where it poses an important public-health concern. Information for this study was collected in a socio-behavioral household survey conducted from June to November 2002 in Kaeng Koi district in central Thailand. The community demand and likely use of a vaccine were examined in relation to the Health Belief Model which provides analytical constructs for investigating multiple issues of local readiness to accept and access a new vaccine (8,9). This information is critical for developing policy and planning for the introduction of a new vaccine. This study also demonstrates the utility of applying the constructs of the Health Belief Model to assess community demand and means to introduce a new preventive health measure.

MATERIALS AND METHODS

Study background

This study is part of the International Vaccine Institute's (IVI) Diseases of the Most Impoverished (DOMI) Programme which supports the introduction of new-generation vaccines in several Asian countries. This effort partly entails disease burden, economic, policy and socio-behavioural studies to ascertain the importance and feasibility of introducing a vaccine against shigellosis in Pakistan, Thailand, Bangladesh, Vietnam, Indonesia, and China.

The sociobehavioural survey on shigellosis in Thailand is a follow-up activity based on the findings of an IVI policy study with Thai government policy-makers in which a vaccine against shigellosis was identified as an important addition to the immunization programme of Thailand. The policy-makers noted the importance of a vaccine to meet its disease-burden levels and the uncertainty of continued improvements in water and sanitation conditions (10).

The epidemiological evidence also indicates the need for a vaccine for shigellosis in Thailand. A DOMI disease-burden study in Kaeng Koi district, which involved a two-year passive surveillance at 20 community health centres, found that, of 5,202 cases of diarrhoea reported during May 2000-December 2001, 182 (3.5%) cases were of shigellosis. While this finding suggests endemic conditions of the disease (11), epidemic outbreaks of shigellosis have also been reported in Thailand (12). Moreover, drug-resistant strains of *Shigella* have emerged in Thailand over the past 20 years (13,14).

Theoretical model of vaccination behaviour

The Health Belief Model provides an important set of constructs for identifying and understanding the multiple factors that influence the demand and delivery of a vaccine. It is an influential and widely-used theoretical model initially developed by the U.S. Public Health Service to provide a framework by which public-health officials could predict who would engage in certain preventive behaviours (8,15). It is based on a 'value-expectancy' theory (16), which means that cognitions and perceptions (expectancy) about the value of some health outcome drive the adoption of the behavior that might influence that outcome (16). The key components of the model are: (a) perception of threat, which is conceived as two components: perceived severity of and susceptibility to an adverse outcome; (b) perceived outcome expectations which are examined as perceived benefits and perceived barriers to performing a protective behaviour; (c) cues to action, or the facilitative mechanisms and contexts for introducing a protective behaviour; (d) other variables, such as sociodemographic factors and cultural beliefs, which influence the individual's response to the model, frequently called modifiers, and (e) likelihood of the behavioural outcome.

An important tenet of the Health Belief Model is the idea of perceived threat, which is the combination of an individual's perception of severity of a health problem

and that individual's perceived susceptibility of being affected by a potential health risk. Another key factor affecting health beliefs and behaviour is the perception of outcome expectations—what a person feels will be the result of some action—considered as either perceived benefits or perceived barriers to achieving a desired outcome.

Perceived outcomes of expectations are what persons feel to gain benefits from behavioural change or feel a negative impact of barriers from such behavioural change.

The third construct of the model is cues to action, which are prompt, which influence a person to initiate the completion of a recommended behaviour change or action.

Sociodemographic factors or modifiers are of a demographic, social or psychological nature that is likely to influence the health outcome resulting from some action. These include such factors as gender, race, socioeconomic status, level of education, or general health-related attitudes and behaviours.

Two important caveats are in order. As we mentioned, the *Shigella* vaccine under study is not yet introduced in the field as a viable vaccine. Hence, when asking about vaccine-related behaviour, the respondent is considering a vaccine that has no known properties of effectiveness or adverse side-effects. By the same token, the Health Belief Model is a value expectancy model of personal behaviour change that assumes that some behaviour, if taken, will have value. In this case, the value is disease-protection. In the case of a hypothetical vaccine, the value is thought to be universally high. However, as the following research shows that there are perceived barriers to using the vaccine and perceived benefits and cues to action, or mechanisms for effectively delivering the vaccine.

Geography and population of research setting

The research was carried out in Kaeng Koi district in Saraburi province, located 110 km northeast of Bangkok. The district is divided into 14 subdistricts, in which two of the subdistricts are key municipality and urban centres. The district is also divided into 8 zones based on geographical variations, such as mountain, river, and municipality zones. In 2001, Kaeng Koi had a total population of 86,556, of which 43,068 were male and 43,488 were female residents. Of the total population, 42% were living in the municipalities, 7.9% were children aged less than five years, and 10.0% were elderly people aged over 60 years. Seasonal work

attracted movement of workers between Kaeng Koi and Bangkok. All individuals, aged over 18 years, living in the research site were eligible to participate in the survey research.

Four of the 8 zones were selected as our research sites because they represent the range of variation in geographic and socioeconomic communities in the district. We used stratified random sampling to identify a proportional representation of respondents from the zones for the survey. The study recruited 522 individuals from the district census book 2000, who were stratified according to the population density in the zones (Table 1).

Table 1. Study samples distributed proportionally by zones, Kaeng Koi district, 2002

Zone	Population (n=14,865)	Sample		
		Male (n=237)	Female (n=285)	Total (n=522)
River	1,643	28	33	61
Industrial	5,505	86	104	190
Municipality	6,050	96	116	212
Mountain	1,667	27	32	59

Questionnaire development

The generic questionnaire, developed at a meeting of the *Shigella* DOMI study teams and IVI staff in Bangkok in 2002, was based on the health beliefs and behavioural domains relating to perceptions of vulnerability, severity, and seriousness of the disease, its prevention and treatment, general vaccine use, acceptance of a possible *Shigella* vaccine, its preferable cost and approaches to delivery of a vaccine. The questionnaire was then back-translated into English, corrected in the Thai version, pre-tested with 50 interviews, and revised again into a final version.

Data-collection and analysis methods

During June–November 2002, five interviewers collected data by conducting face-to-face interviews with an adult member of a sampled household. Only 5% of those contacted for recruitment either refused or were unavailable to participate. Raw data were double-entered into the FoxPro Program, and the completed dataset was finally transported into SPSS for analysis. The data were analyzed according to the constructs of the Health Behaviour Model in relation to sociodemographic variables and distributions of factors relating to perceptions of bloody dysentery, its treatment and prevention, and the potential acceptability and accessibility of a vaccine against it.

RESULTS

The results are presented by sections to interpret and reflect attitudes of the respondents towards the outcome variable, interest in a vaccine against shigellosis, which is considered in local terms as bloody dysentery. There are two sections on sociodemographic and background information (knowledge of dysentery and help-seeking), and then sections relating to each component of the Health Belief Model.

Population characteristics, help-seeking behaviour, and knowledge of dysentery

Sociodemographic characteristics

The age of 522 respondents ranged from 18 to 79 years. The number of females (55%) was slightly higher than that of males (45%) in the sample. Almost all members of the study sample were Buddhist.

The average number of family members was 4.2 (range 1-11). In Kaeng Koi, 40% of the population were unemployed. Traders (19%), labourers (16.7%), and farmers (14.9%) were the dominant occupations in the study sample. Fifty percent of the households were earning less than 10,000 Baht (US\$ 232) per month. Moderate-income households had slightly more respondents (31.8%) than other individual income groups, but this group was only modestly higher than the lowest income groups ranging from 10,000 to 20,000 Baht (US\$ 232-465) per month. 72.6% of the respondents had received only primary schooling, 17.8% had graduated from high school, and only 2.3% were university graduates.

Help-seeking behaviour and attitudes

Kaeng Koi district has 20 government health centres, one community hospital, and two private hospitals. Table 2 shows that 73.6% of the respondents chose the community health centres, along with public hospitals,

Table 2. Use of health services by respondents, Kaeng Koi district, 2002

Point of health services	Frequency (n=522)	Percentage
Health centre	208	39.5
Public hospital	178	34.1
Private clinic	83	15.9
Private hospital	30	5.7
Pharmacy	13	2.5
Others	10	1.9

as the first choice for healthcare, and 15.9% chose private clinics for their key source of care due to the convenience and quality of care they provide for those who can afford them. Many people also chose to buy over-the-counter-drugs from small pharmacies in their villages.

The factors identified that influenced the choice of a treatment facility indicated that distance (65%) was the most common factor influencing the majority of the respondents, with other considerations, such as drug availability, hours opened, and speed of consultation at the health facilities, important to only a quarter of community members.

Knowledge of dysentery

The local term for bloody dysentery commonly used nationwide is 'bid' which refers to stools with blood and mucous and severe abdominal pain. However, some respondents mentioned other more formal linguistic terms, such as '*udjara-mook-leud*' (literally mucous and blood in stools) and '*tong-sia-pen-leud*' (literally bloody stools) which are also occasionally used.

The respondents' perceptions of the causes of bloody dysentery were related to food and water, unhygienic behaviour, environmental conditions, and humoral factors. Over 75% of the respondents identified biomedically-related factors, especially unhygienic behaviour, as sources of infection leading to dysentery. This indicates a level of knowledge that may be protective of the risk factors that lead to dysenteric infection. Unclean foods, foods contaminated by flies or 'exposed food' were considered as major sources of dysentery (i.e. 95% of respondents), along with not washing hands (i.e. 90% of respondents). Humoral theories relating to illness and diet, and more general food beliefs, such as excessive ingestion of sour or spicy foods, are part of the food and health culture of Kaeng Koi and, though important (i.e. 60% of respondents), were not as prominent as the belief that dysentery is caused by bacteria and germs and a lack of personal and environmental hygiene.

Health belief constructs and shigellosis

Perceived outcomes of expected behaviour

Perceived benefits

Perceived benefits refer to an individual's perception of what they will gain by, in this case, taking a vaccine for shigellosis. It is assessed in terms of: beliefs about the purpose of vaccines, satisfaction with existing immunization

efforts, thoughts concerning the desired duration of effectiveness of a vaccine, and other desirable vaccine characteristics. If benefits are thought to be high, action towards prevention (i.e. vaccinations) is thought to be considerable.

a. Attitudes towards use of vaccines and their relation to dysentery

The majority (69.5%) of the respondents thought that the purpose of a vaccine was to protect all people from disease. Still, 28.5% thought that its purpose was mainly to protect children, perhaps, because of widespread participation in the Expanded Programme on Immunization in their communities. Very few thought that vaccines should be used for treating diseases, thus indicating general knowledge of the purpose and value of vaccines.

Vaccines were also perceived as an accepted and appreciated form of prevention services. 67.4% were satisfied and 16.5% very satisfied with immunization services in their community. These services were largely provided at the health centres and public hospitals. If a vaccine for bloody dysentery were available, most respondents thought that it would be useful for protecting children (99.8%) and adults (96.6%) against the disease.

Over 86% believed that a vaccine against dysentery, or 'bid', would benefit both male and female children, with 66% maintaining that it would benefit adults. This variation may indicate the general belief that children are considered highly susceptible to dysentery and in need of a vaccine. Very few thought that a vaccine would provide them negligible protection and were not willing to use it.

b. Attitudes towards prevention of a vaccine for dysentery

The most widely-held belief in the best means of preventing dysentery was in the protection afforded by a vaccine (Table 3). There was a range of approaches to preventing dysentery that related to individual and community-preventive efforts and beliefs in the

causes of dysentery. However, a large proportion thought that they provided only partial protection.

At least half of the respondents thought that individual behaviour in avoiding 'bid' or contaminated food, drinking unclean water, and habits of poor personal hygiene were good means of prevention. At the community level, improving disposal of garbage and faeces and water supply were also considered as important preventive activities. The majority of the respondents, however, generally saw these individual behavioural and community efforts as providing partial protection. The community members suggested that one could still be susceptible to dysentery by not attending any preventive efforts. Thus, the preventive benefit of a vaccine against dysentery stands out as the most important protective measure to prevent dysentery among the respondents.

c. Duration of prevention

32.6% of the respondents believed that a vaccine against dysentery should be protective for 2-5 years, whereas 23.9% expected that the duration of its effectiveness should be lifetime. The duration of protection of a vaccine was a major factor for 60.9% of the respondents to take decisions to receive a vaccine against dysentery. As suggested in this study and in an earlier qualitative study (17), the length of potential protection of a vaccine is considered a benefit in its acceptance, although there is flexibility in the duration of protection that would be acceptable (Table 4).

In sum, the protective effect of vaccines for family members, especially children, was believed to provide the most favourable form of prevention compared to other preventive measures. Along with its potential length of protection, these factors were perceived as benefits in using a vaccine against dysentery.

Perceived barriers

Perceived barriers to taking action are characteristics of a situation surrounding a preventive behaviour that

Table 3. Attitudes towards preventive behaviour and conditions for individuals

How well can each of the following prevent dysentery ('bid')? (n=522)	No or little prevention		Partial prevention		Good prevention	
	Frequency	%	Frequency	%	Frequency	%
Taking vaccine	4	0.8	66	12.6	452	86.6
Avoiding drinking dirty water	15	2.9	213	40.8	294	56.3
Avoiding eating bad food	18	3.4	219	42.0	285	54.6
Improving disposal of garbage	20	3.8	223	42.7	279	53.4
Improving disposal of faeces	26	5.0	229	43.9	267	51.1
Avoiding poor personal hygiene	22	4.2	240	46.0	260	49.8
Improving water supply	29	5.6	235	45.0	258	49.4
Taking herbal medicine	211	40.4	238	45.6	73	14.0

may impede interest or involvement in the behaviour, such as in the use of a vaccine. For example, if vaccinations are thought to be too inconvenient, expensive, or unpleasant, or the disease is easily treated and avoided, even when weighed against the many perceived benefits of a vaccine, the individual may be less likely to take the desired preventive action. In the case of dysentery, the barriers identified include: ability of household to afford the vaccine (for different age and gender groups), cost of a potential vaccine, and ability to avoid the risk factors leading to the disease.

Table 4. Length of protection of vaccine for dysentery, Kaeng Koi district

Length of protection	Frequency (n=522)	Percentage
1-12 month(s)	74	14.2
13-24 months	117	22.4
25-60 months	170	32.6
61-120 months	36	6.9
Lifetime	125	23.9

a. Affordability, cost of care, and interest in a vaccine

Cost and burden of care for cases of dysentery were considered manageable by many community residents. More than 70% thought that, when family members are sick due to bloody dysentery, they would receive care from the head of household who would take them to the district hospital or health centre. Sixty-eight percent felt that they would be able to manage their own care themselves. The remaining 32% mentioned that they would need someone in the family to look after them during an illness, although the cost of care was considered affordable. Dysentery was, thus, considered a burden for family members, although perceived within their capacity to manage it.

The spouse of the respondents was generally the most important person to receive care in the family (92.1%). This may reflect the fact that the respondent and his or her spouse provide the main source of income for the family, so that if one of them becomes ill, it would be a greater burden on the family. In general, the cost of managing a case of dysentery was not considered to be an impediment to its care. This may make a case against the need for a vaccine. However, when the relationship between the affordability of care for dysentery and interest in a vaccine against it was examined, 99% of the respondents who could afford care still wanted a vaccine for their children and themselves. Thus, the afford-ability of care for dysentery did not act as a barrier to community interest in a vaccine for

dysentery, which suggests acceptance of its value in protecting the family from unwanted illness and related burdens.

In relation to the price of a potential vaccine against dysentery, most respondents felt that they could afford to pay a nominal fee for it; with a majority claiming that they could afford to pay under 100 Baht (US\$ 2.50) for it (Table 5).

Table 5. Price of a dysentery vaccine respondents can afford, Kaeng Koi district, 2002

Price	Frequency (n=522)	Percentage
Need it free	136	26.1
30 Baht or less	139	26.6
31-50 Baht	105	20.1
51-100 Baht	109	20.9
Above 100 Baht	33	6.3

26.1% of the respondents stated that the vaccine should be free of charge, while 26.6% thought that the cost should be 30 Baht or less. Thus, the cost of a vaccine was largely expected to be less than 100 Baht, which may act as a barrier to its acceptance if its cost exceeds this amount. Yet, we observed that income was not a determining factor in the cost a family would pay for a vaccine.

b. Influence of prevention measures on interest in receiving a vaccine

The respondents were asked if they would need a vaccine if they could avoid a number of risks for contracting dysentery. Over 80.0% strongly confirmed that they would still need it. They mentioned that even if they could avoid hot foods and unhygienic behaviour, they would still need a vaccine, suggesting that not only these risks, but a host of other factors place them at risk for contracting dysentery, as noted earlier in the discussion on preventive measures.

Finally, the respondents were asked about their perceptions of the government's role in sanitation and water provision. Nearly all thought that the government should have a role in improving water systems and disposal of faeces and garbage, and in keeping the community clean. Although the residents thought that the improvements were important, they still perceived a strong need for a vaccine against bloody dysentery. Eighty-one percent thought that even if the government improves piped water, disposal of faeces, and garbage collection, the vaccine would still be needed, indicating

that the government policy towards these activities is important but is not an adequate alternative to a potentially effective vaccine.

This section shows that a number of factors that were expected to act as barriers to an interest in receiving a vaccine against dysentery did not greatly reduce interest in it. These factors seemed to be outweighed by the perceived potential benefits of a vaccine and the threat of contracting dysentery. These issues are further discussed below.

Perceived threat of disease

Perceived severity

Perceived seriousness or severity relates to beliefs about the outcome that a disease or condition would have on the well-being of an individual. The outcome should be considered from the point of view of the burden that the disease or condition would create. In the case of bloody dysentery, these can be pain, discomfort, financial and work burdens, and susceptibility to future conditions. In this analysis, burden is considered with respect to: perceived seriousness of infection compared to other diarrhoeal and common illnesses, expense and speed of recovery, and knowledge of or contact with mortalities from bloody dysentery. Each is considered in terms of its risk to members of various categories relating to age, gender, and social standing.

a. Perceived seriousness of bloody dysentery

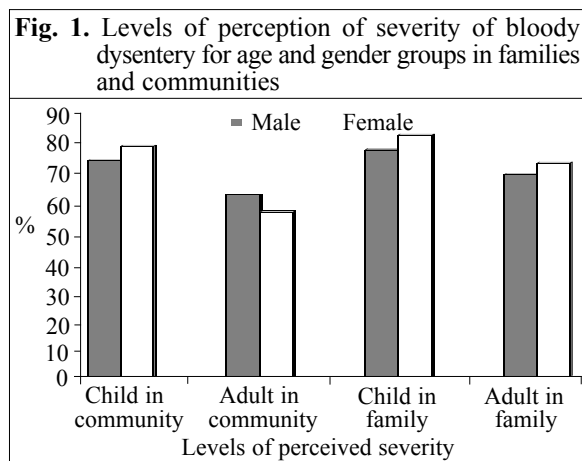
The perception of severity of bloody dysentery was examined in relation to other diarrhoeal diseases and health problems in the community. 83.5% of the respondents perceived that mucoid dysentery (without blood) was less severe than bloody dysentery. But when compared to other diarrhoeal diseases, 62.3% indicated that bloody dysentery is less severe than dysentery with runny, watery stools, as for example cholera, which in their view is more dangerous. Symptomatically, bloody dysentery produces less stools than frequent watery dysentery.

When comparing bloody mucoid dysentery with other health problems, 55.4% of the respondents perceived bloody dysentery as not serious, while 21.1% perceived it as serious and 23.6% believed it to be comparably very serious. Regarding the degree of concern that bloody dysentery presents for the community, again, 58.4% mentioned that the disease was not a concern, while 41.6% reported that the disease was somewhat of a concern or a big concern to members of the community. Thus, there was a near-even division in perceptions of its seri-

ousness and concern to the community. Variation in perceived seriousness and concern for dysentery might be related to differences in perceptions of vulnerability for particular age groups and participation in risky behaviours, which are discussed below.

b. Comparison of severity between genders

Eight items were examined to compare how serious bloody dysentery was perceived to be for male and female children and adults. Figure 1 presents the percentage of the respondents who perceived the disease as severe in their community and in their family for both the genders. Over 70% thought that bloody dysentery was severe for children of both the genders in their community and in their family. However, the disease was perceived as less serious for adults in their community ($\leq 60\%$) and in their family ($< 70\%$) for both the genders. Thus, children were perceived as suffering more severe forms of bloody dysentery than adults.



c. The burden for treatment of bloody dysentery

The expense of treating bloody dysentery differed for both the genders in relation to the level of severity of the disease. These differences may be expected in relation to a comparison of mild and severe dysentery. Mild cases of dysentery would naturally pay less for treatment compared to more severe cases (Fig. 2). However, in severe cases for all age groups, treatment was thought to be expensive and potentially a burden, especially if a sufferer had to be admitted to the hospital (i.e. incurring additional costs for food, transportation, and medication).

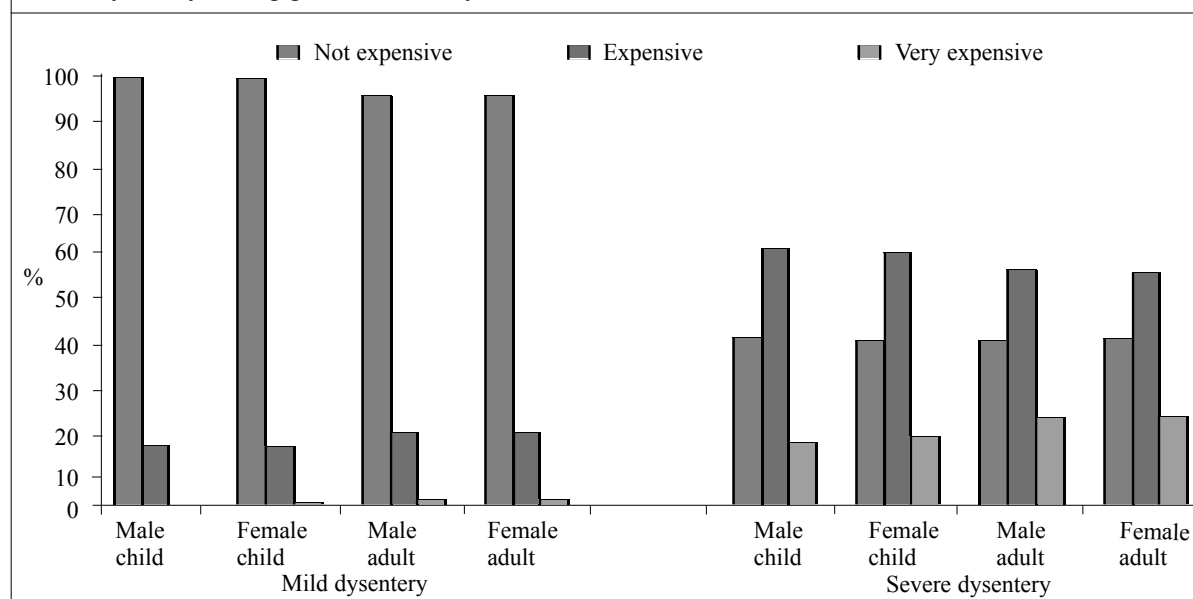
d. Speed of recovery from bloody dysentery

89.8% of the respondents had a general opinion that the length of time to recover completely from severe bloody

dysentery was from a few days to a week. However, there was a range of attitudes regarding speed of recovery for different age groups. For example, 28.0% felt that infants

who would refuse to receive a vaccine if it were available. This desire for a vaccine reflects the threat that bloody dysentery poses as a disease, whether or not it is

Fig. 2. Comparison of expenses for treatment for mild (left bar group) and severe (right bar group) bloody dysentery among genders of family members



would take a few weeks to recover, while 23.8% thought that they could recover in a few days. The distribution of responses for infants was similar to the rates of recovery noted for preschool-age children. Among children aged 6-14 years, the recovery rate was considerably less with most respondents indicating that only a few days were needed for recovery. Similar to that of young children, the respondents thought that the elderly, particularly females, would have a slow recovery from the disease.

e. Cases of dysentery in family and awareness of cases of mortality

The respondents were asked who in the family had ever suffered from bloody dysentery. 17.2% had a family member who had bloody dysentery. Thus, there was a moderate level of lifetime prevalence of cases of the disease in families. Only 2.5% were aware of any deaths occurring from bloody dysentery.

f. Association of severity of bloody dysentery with vaccine desirability

Ninety-seven of the respondents expressed the need for a vaccine to protect themselves and their family members from bloody dysentery, with only a very few individuals

perceived as a health concern in the community or as less severe compared to other forms of diarrhoea.

Table 6 shows the relationship between the desirability of a vaccine for dysentery and the variables relating to perceptions of severity of bloody dysentery compared to other forms of dysentery and health problems. The distribution of these variables across perceived levels of severity is generally similar. This suggests that interest in a vaccine is widespread and that bloody dysentery and other forms of diarrhoea and other health concerns are also considered to have potentially severe consequences.

Perceived susceptibility

Perceived susceptibility is the situation where each person perceives how likely it is that a condition or disease would negatively affect their own or their family's health. The assumption is that there is a continuum of interpersonal variation in perceptions of susceptibility. Persons with the lowest perception of susceptibility assign low likelihood of risk of acquiring a disease or condition and those at the highest end assume that there is a high risk of acquiring a disease or condition. In this analysis, perceived susceptibility is considered with

respect to the respondent and others in their household and community who should receive the vaccine, those

be at high risk for infection are people who eat outside the home, preschool-age children (1-5 year(s) old), and the

Table 6. Association of a vaccine as desirable protection in relation to levels of severity of bloody dysentery, Kaeng Koi district

Levels of severity	Yes, want a vaccine (frequency)	No, do not want a vaccine (frequency)
Severity of bloody dysentery compared to other diarrhoeal diseases (n=521)		
Less severe	318	7
About the same	42	2
More severe	147	5
Total	507	14
Bloody dysentery compared to other health problems (n=522)		
Not serious	281	8
Serious	108	2
Very serious	119	4
Total	508	14

who are likely to get the disease among differing categories of individuals, perception of the prevalence of the disease in the community and behaviour that heightens vulnerability to bloody dysentery among particular age and work groups.

The results indicate, as mentioned above, that people generally feel that there is a limited prevalence of the disease 'bid' in the community. For example, about 93% thought that the disease was not common in their community (Table 7). In response to a separate question, 67% thought that there was less bloody dysentery in their area than they recalled in the past. Only 13% thought that there was an increase in the disease.

Table 7. How common do you think dysentery is in your community?

How common is dysentery	Frequency (n=522)	Percentage
Not so common	483	92.5
Common	25	4.8
Very common	10	1.9
Don't know	4	0.8

These findings revealed additional aspects of the social and age groups that are considered vulnerable to bloody dysentery. For example, the respondents were nearly evenly divided between those who thought it unlikely (53%) that someone in their home would acquire the disease, and those who thought that it would be likely (46%). Only 1% thought it very likely that someone in their home would acquire 'bid'. However, the respondents thought that there were particular age, behavioural and socioeconomic groups who were at risk for bloody dysentery. In descending order, groups perceived to

elderly (above 56 years) (Table 8). The respondents also stated that the disease is a threat to groups, such as infants, school-age children (6-12 years old), and poor labourers. Hence, perception of personal or familial risk is generally lower than that perceived for particular categories of individuals. This suggests that variations in the age composition of households may lead to differences in the perception of family or community members at risk for dysentery.

Most respondents observed that bloody dysentery was not as common in the community as before, with its prevalence decreasing over time, but they thought that children should be candidates for vaccination against the

Table 8. Groups vulnerable to bloody dysentery in Kaeng Koi district, 2002

Vulnerable groups	Frequency	Percentage
People eating outside home (n=522)	387	74.1
Elderly (56+ years) (n=522)	373	71.5
Preschool-age children (1-5 year(s)) (n=522)	361	69.2
School-age children (6-12 years) (n=522)	347	66.5
Poor labourers (n=522)	322	61.7
Infants (<1 year old) (n=522)	298	57.1

disease (Table 9). For example, 99% maintained that both male and female preschool-age (1-5 year(s)) children should get the vaccine, 97% recommended vaccination for school-age (6-12 years) children, and 92% endorsed vaccination for the infant age group (<1 year old). The remaining adult age categories for which the question

was asked include young (13-24 years), middle (25-55 years), and older (56 years and above) age groups with support for their use of the vaccine at 81%, 86%, and

Table 9. Age and gender groups most recommended for a vaccine

Age and gender	Frequency	Percentage
Male preschool (1-5 year(s)) should get vaccine (n=522)	516	98.9
Female preschool (1-5 year(s)) should get vaccine (n=522)	516	98.9
Male school-age children (6-12 years) should get vaccine (n=522)	507	97.1
Female school-age children (6-12 years) should get vaccine (n=522)	507	97.1
Male infants (<1 year) should get vaccine (n=522)	480	92.0
Female infants (<1 year) should get vaccine (n=522)	480	92.0

89% respectively. There were no significant gender differences in levels of support for vaccination for these age groups.

In sum, few people felt a high degree of susceptibility for themselves or household members, and most people thought that the prevalence of dysentery had decreased over time. However, the respondents indicated that pre-school-age children, school-age youth, elderly, and poor labourers are especially at risk for contracting dysentery, particularly if they eat food outside the home, street-vendor food, and sea food.

Cues to action

Cues to action are factors that might encourage an individual to act in the face of their perception of susceptibility to and seriousness of bloody dysentery. While benefits (minus barriers) might provide a path of action, cues influence this behaviour directly. Cues may be internal or external. In the case of a shigellosis vaccine, we consider cues in terms of delivery issues, such as potential site of vaccination, vaccine characteristics, marketing, and policy regarding prevention-control measures. Cues to action especially reflect the most useful means of accessing the vaccine.

Sites and times for vaccination and vaccine characteristics

The most-frequently recommended sites for vaccine administration were government health units for a large majority (86%) of respondents, followed by preferences less-frequently mentioned for vaccines to be delivered

at homes, disease-control clinics, private clinics, and schools (5.0%, 3.3%, 1.5%, and 1.3% respectively). There was also interest in drug stores as a site for vaccination for children but even far fewer respondents recommended it as a site compared to the five most recommended sites (0.4%). There was no difference in preference of site of vaccine administration whether the vaccine was administered orally or parenterally at the vaccine sites.

One percent of the respondents thought that the best time to vaccinate would be with other immunization or health-education programmes, possibly indicating that a heightened need for a vaccine (e.g. during an outbreak) should dictate the form of a vaccine-delivery programme. Fifty-two percent suggested that the appropriate time of year for vaccination is the dry season, whereas 16% recommended that a vaccination programme should take place in the rainy season.

2. Policy and marketing-level cues

Policy and marketing-level cues are those that the respondents thought might impact vaccination marketing and dissemination policy. These included questions about persons who the respondents respected for advice about vaccinations and who should support a vaccination campaign if it were to be launched. At least half or more of the respondents thought that healthcare personnel, community health workers, and physicians would be respected and trusted for disseminating vaccine information. The groups least expected to provide vaccine information were teachers, politicians, monks, traditional healers, 'quacks', and pharmacists (Table 10).

Table 10. Respected persons for providing information on vaccines

Respected person	Frequency	Percentage
Health personnel (n=522)	418	80.1
Community health worker (volunteers) (n=522)	268	51.3
Physician (n=522)	222	42.5
Community leader (n=522)	116	22.2
Politician (n=522)	23	4.4
Teacher (n=522)	21	4.0
Traditional healer, monk, quack, pharmacist (n=522)	<5	<1.0

The marketing techniques proposed by the respondents most frequently were door-to-door marketing and 'miking' through a broadcasting tower. Almost half of the respondents reported that these means would be useful. Approximately, a quarter of the respondents thought that each of the following strategies would be useful: information

distributed at a health clinic, by television, by community leaders, and fliers/leaflets. The techniques that were less-frequently mentioned were: posters, public announcements, and newspapers.

DISCUSSION

This study examined the interest of the study population in a vaccine against bloody dysentery in terms of the constructs of the Health Belief Model to evaluate the multiple factors influencing interest in and potential use of a vaccine for dysentery. As the key outcome variable, most respondents were interested in receiving a vaccine against dysentery, which they thought would provide useful protection against the disease. There was only a moderate number who perceived their families as highly susceptible to bloody dysentery. However, it was perceived that it could potentially cause a burden and additional expense for families, especially if in severe cases and if a parent or spouse contracted it. Most people, in addition, identified a number of groups who were thought to be especially vulnerable to dysentery, such as the elderly, pre-school and school-age children, and poor labourers. These groups were thought to be at especially heightened risk for contracting dysentery if they eat raw fruits and vegetables, sea foods, and foods bought outside the home and from street vendors.

Barriers to the possible use of a vaccine, such as its cost, appear to have been outweighed by its benefits which include positive community attitudes about the purpose and value of vaccines, protective characteristics of a potential vaccine, especially for children and its duration of protection. Furthermore, a number of barriers, such as government support for community-preventive programmes, did not affect interest in or attitudes towards the usefulness of a vaccine.

A number of cues to action, as motivators and support for accepting a vaccine, were identified. An important cue to action was the identification of acceptable sites for the delivery of a vaccine at convenient and familiar healthcare sites, such as government and private health clinics. Health clinic personnel and community health volunteers were reported as respected and trusted sources of information.

This study is limited in design as it was a cross-sectional survey and did not monitor influences on the beliefs and perceptions of the respondents over time.

However, it did examine a wide range of factors relating to the potential acceptance of a vaccine against dysentery, including perceptions of the severity of and susceptibility to the disease, and barriers and benefits to the use of a vaccine against it. These findings make a case for the use of a vaccine, especially for vulnerable groups, although most respondents claimed that they were interested in receiving a vaccine if it was available. This information suggests that inquiries based on components of the Health Belief Model may be useful in identifying community acceptance of a vaccine and the means for introducing it. This is important information for health policy-makers and personnel for planning and implementing vaccine programmes.

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